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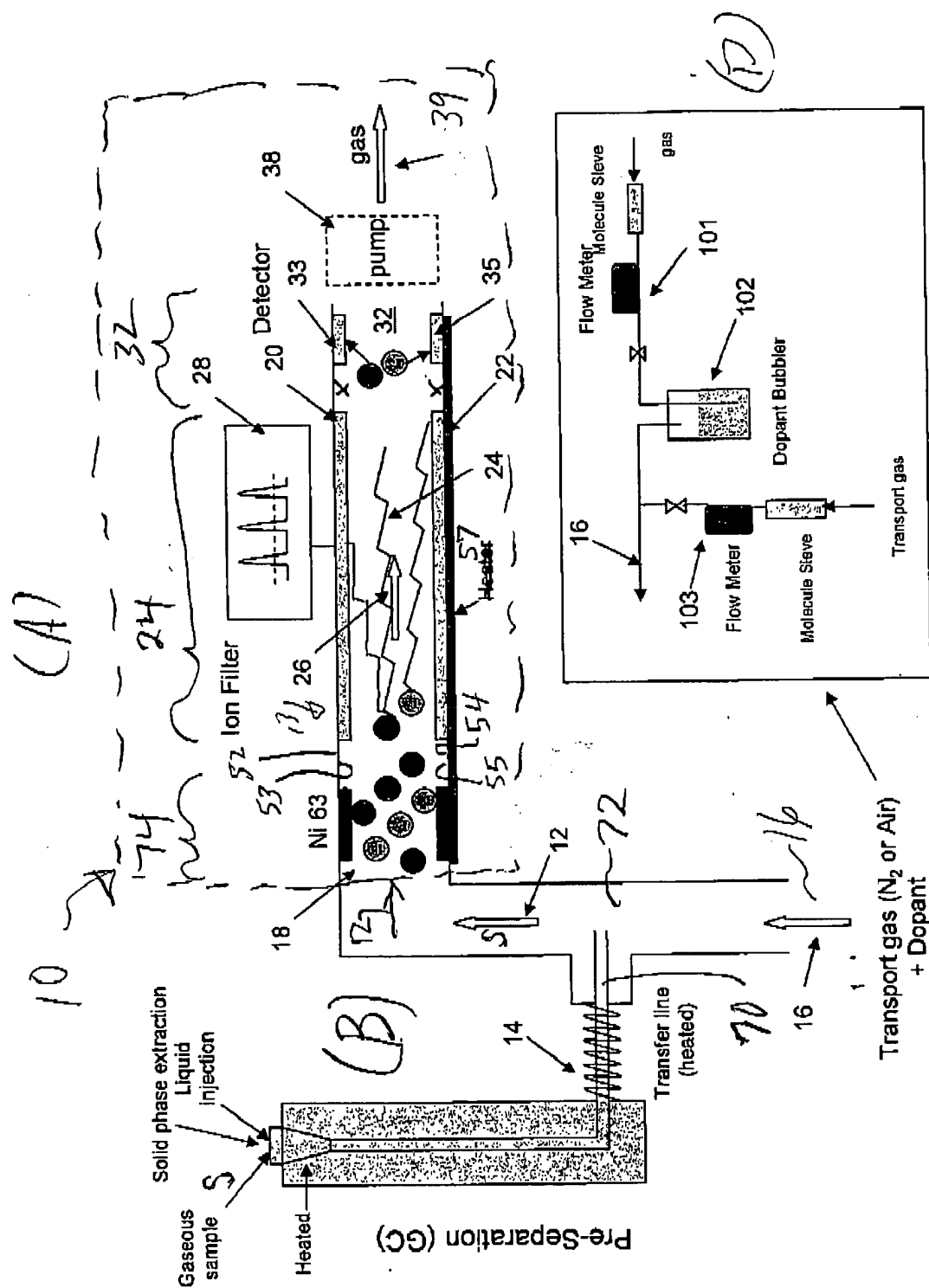
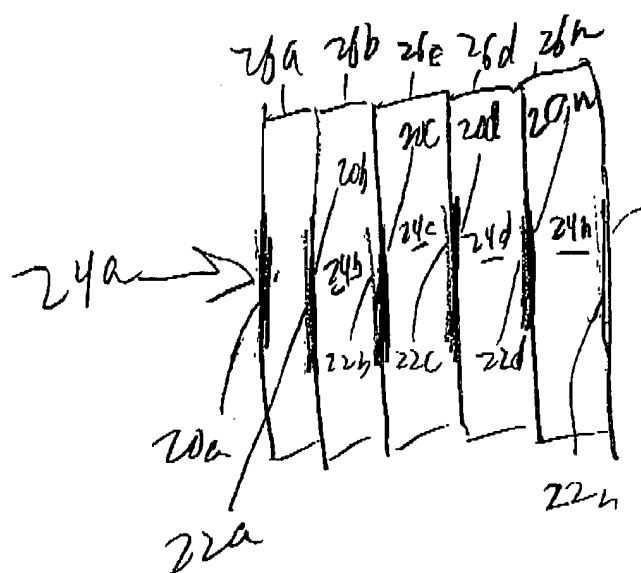
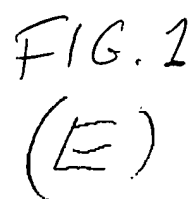
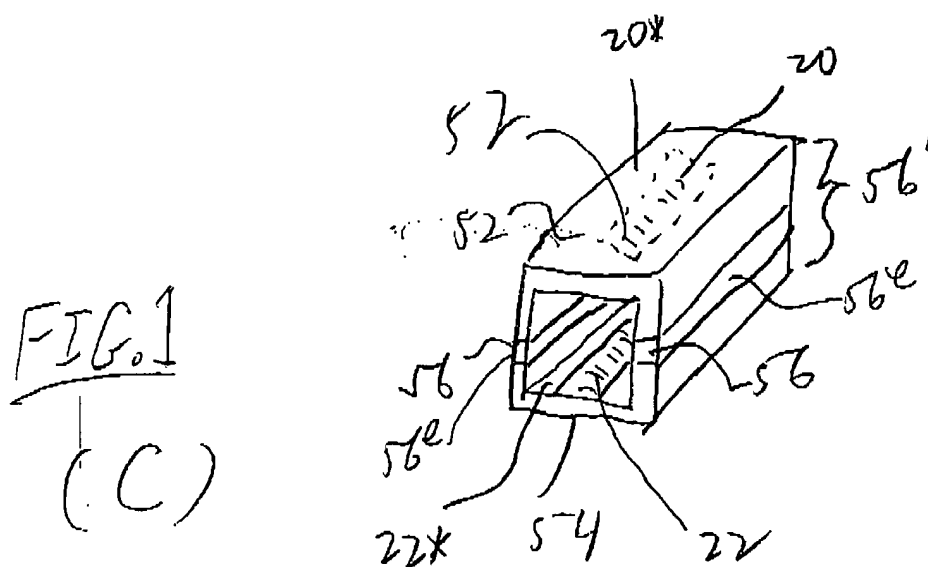


FIG. 1



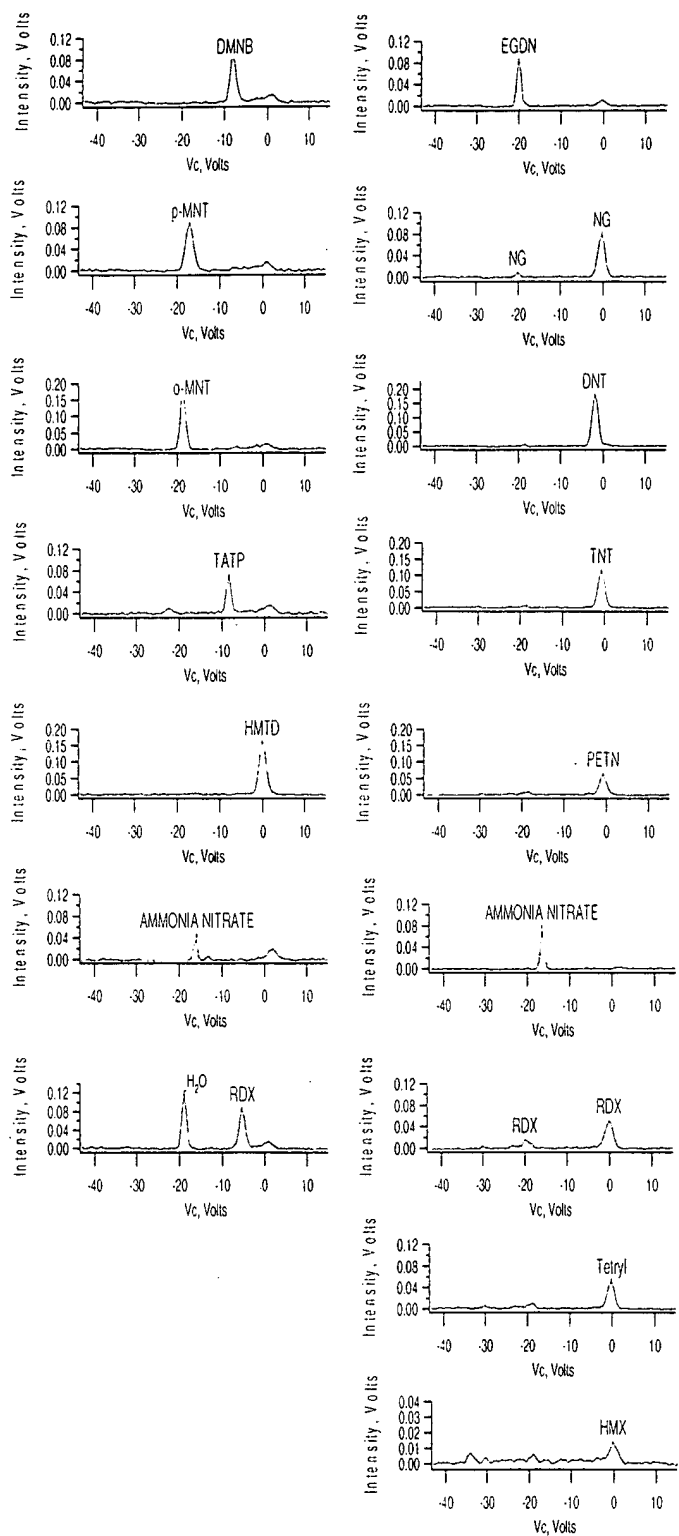


FIG. 2

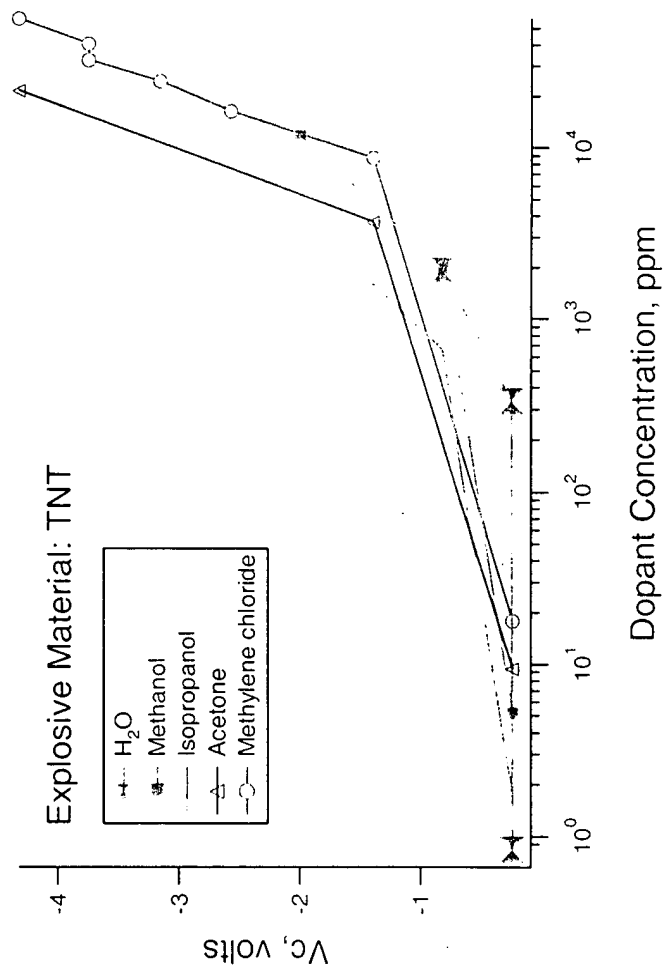


FIG. 3

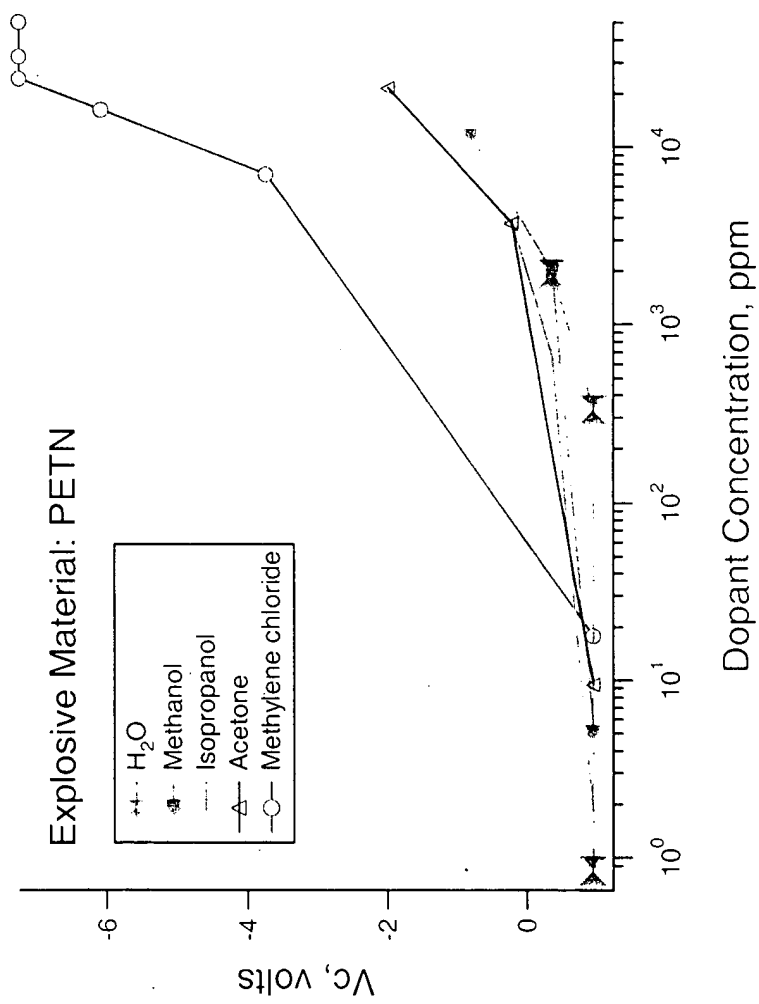


FIG. 4A

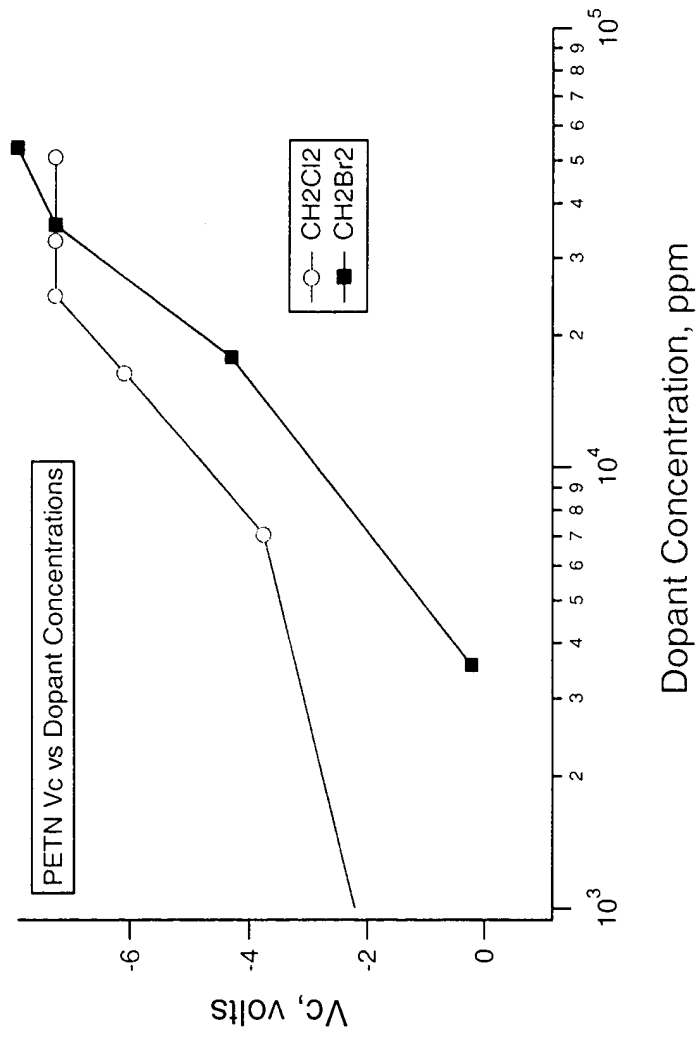


FIG. 4B

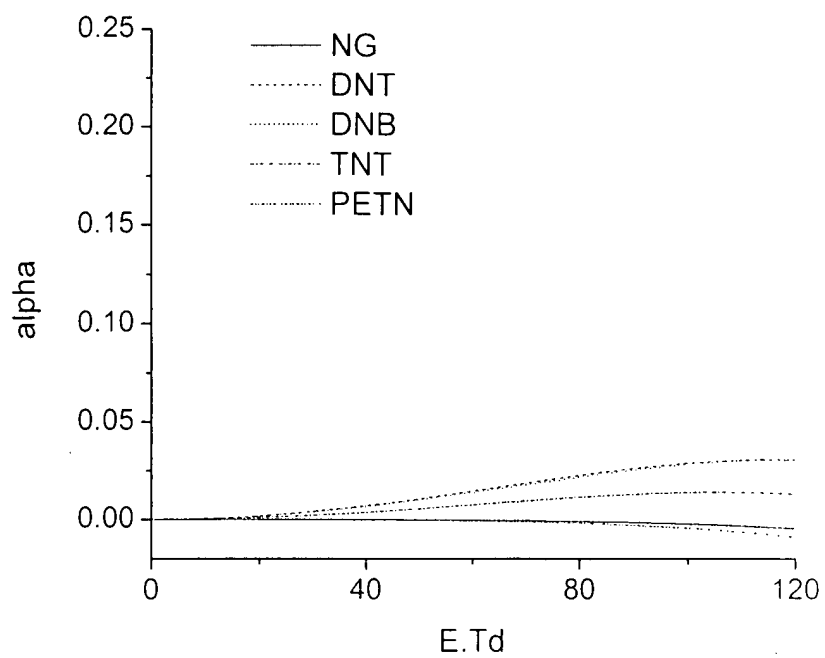


FIG. 5A

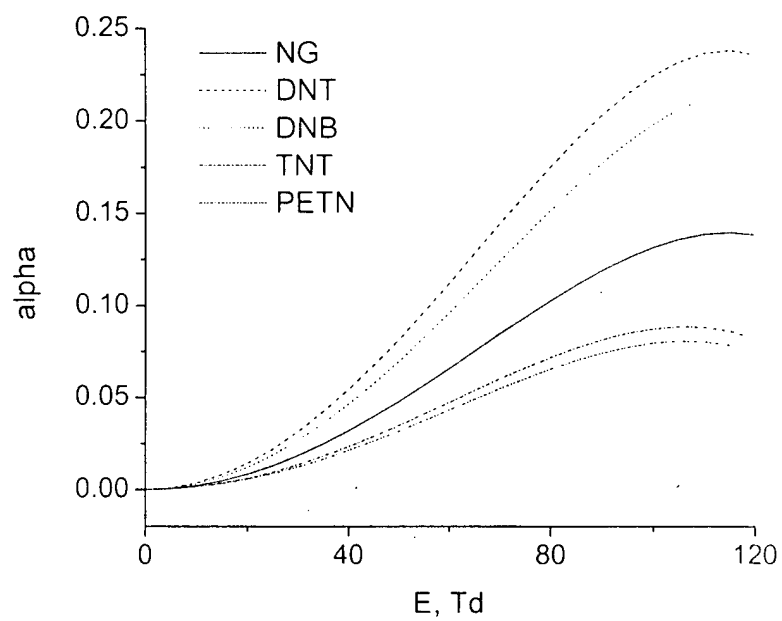


FIG. 5B

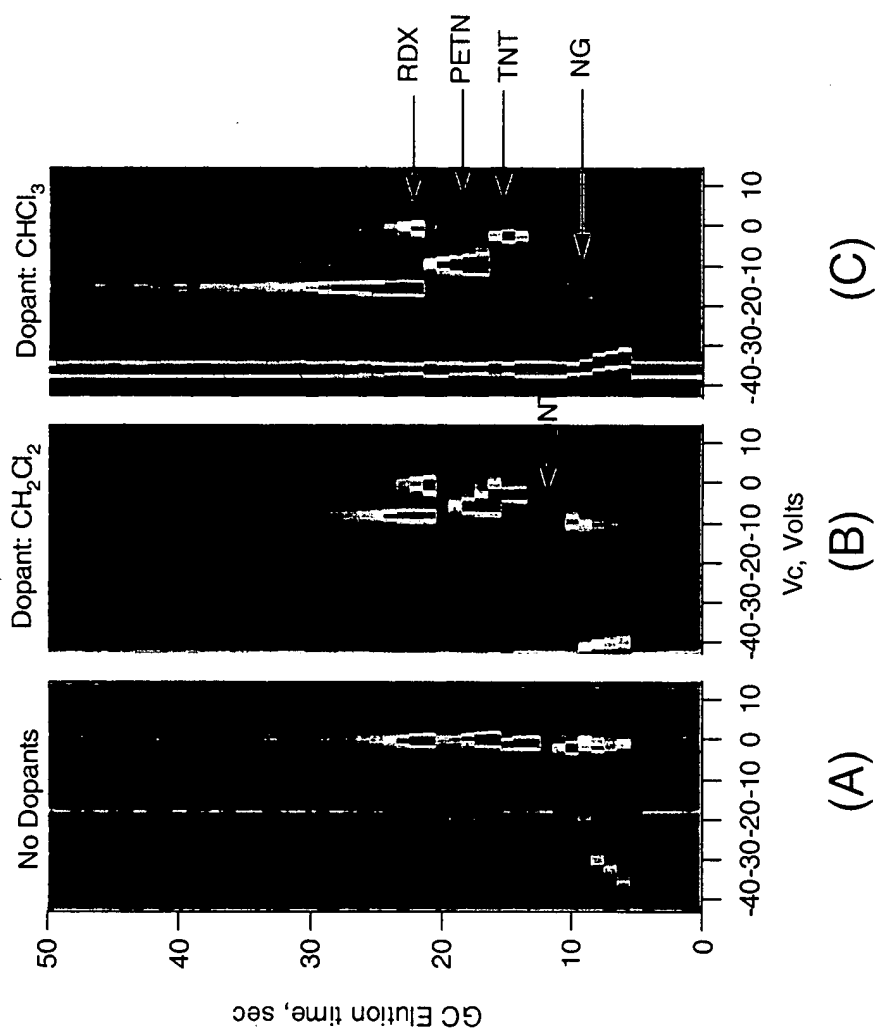


FIG. 6

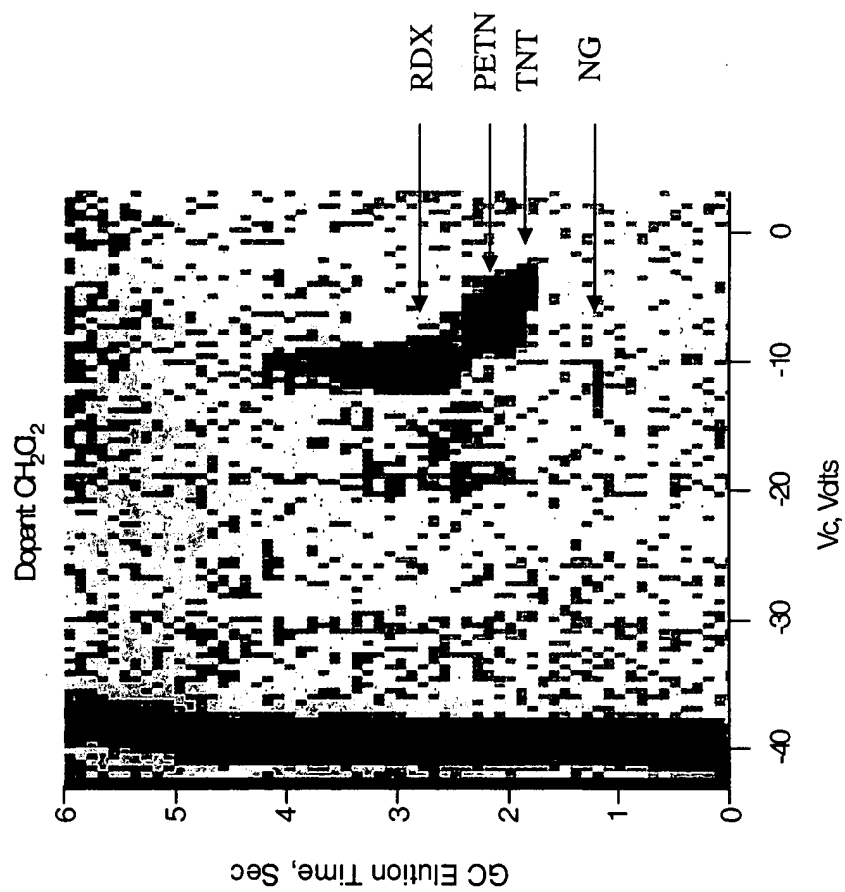


FIG. 7

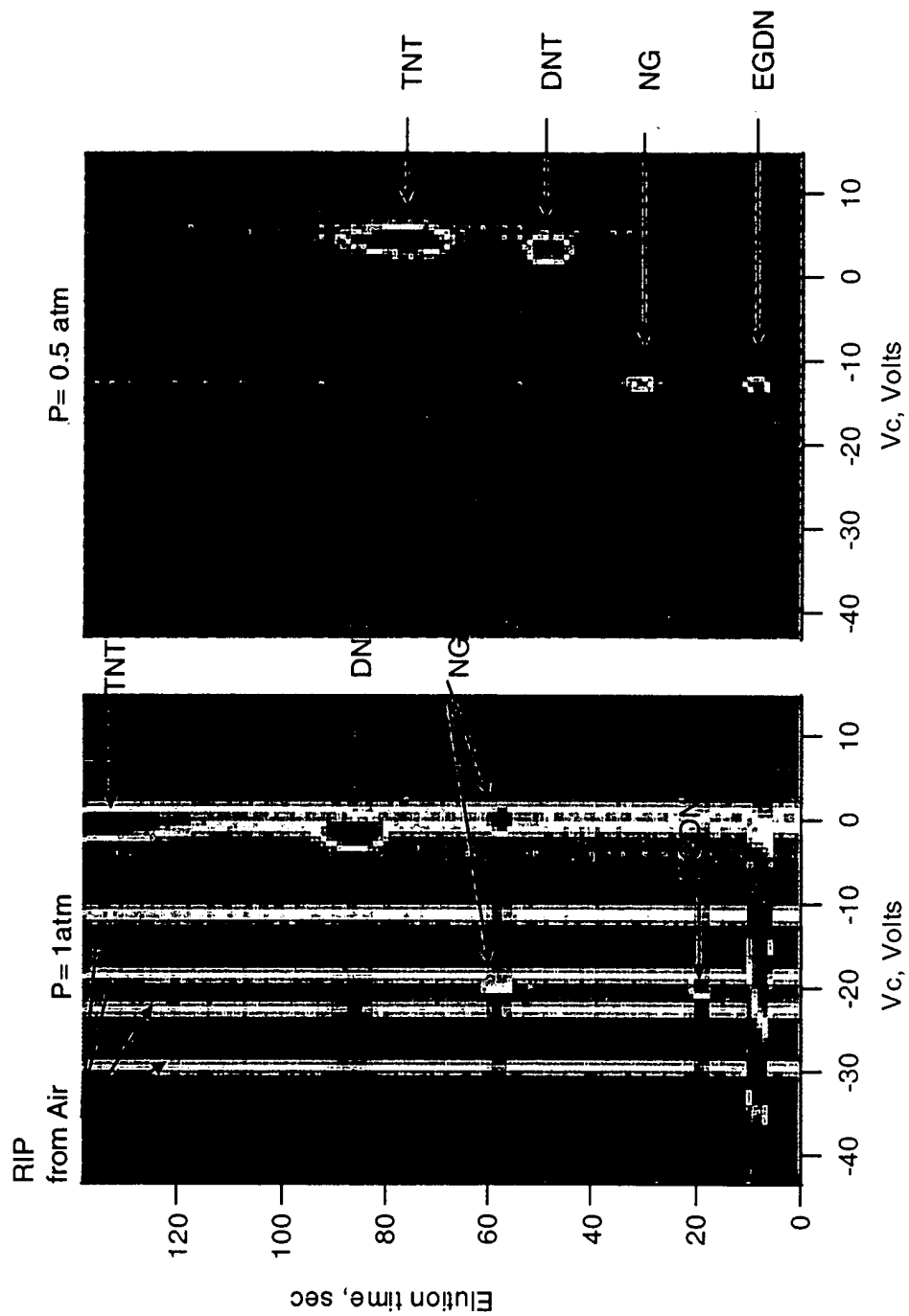


FIG. 8 (a) (b)

Explosive/ Taggant	No Dopant	CH ₂ Br ₂ , 2%	CH ₂ Cl ₂ , 2.5%	CH ₃ OH, 1%	Isopropanol, 2%
	√, Negative Vc=-0.23 Rf 950V, Air, 120 C, 1atm long drag, inlet T 150- >190C, Oven T 50->100C, 80C/m->100C/m	√, Negative Vc=-4.9 Rf 950V, Air, 120 C, 1atm long drag, inlet T 150- >190C, Oven T 50->100C, 80C/m->100C/m	√, Negative Vc=-6.1 Rf 950V, Air, 120 C, 1atm long drag, inlet T 150- >190C, Oven T 50->100C, 80C/m->100C/m	GC temperature was low, HMX did not move.	Not measured
HMX t=95 sec					
	√, Negative	Not measured	√, Negative	√, Negative	Not measured
Tetryl t=116 sec t=160 sec	Vc=-0.23 Rf 950V, Air, 120 C, 1atm inlet T 150, Oven T 50, 80C/min split 5:1, f=8 cc/min unless specifically noted, other molecules are under same GC conditions		Two peaks Vc=-1.99, -6.68, Rf 950V, Air, 120 C, 1atm	Vc=-0.82 Rf 950V, Air, 120 C, 1atm	
	√, Negative	√, Negative	√, Negative	√, Negative	√, Negative
PETN t=104 sec	Vc=-0.23 Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-7.9 Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml long drag	Vc=-5.51 Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-1.5 Rf 950V, Air, 120 C, 1atm, mix6x10 GC column flow was low	Vc=-5.51 Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml

FIG. 9 (Part 1)

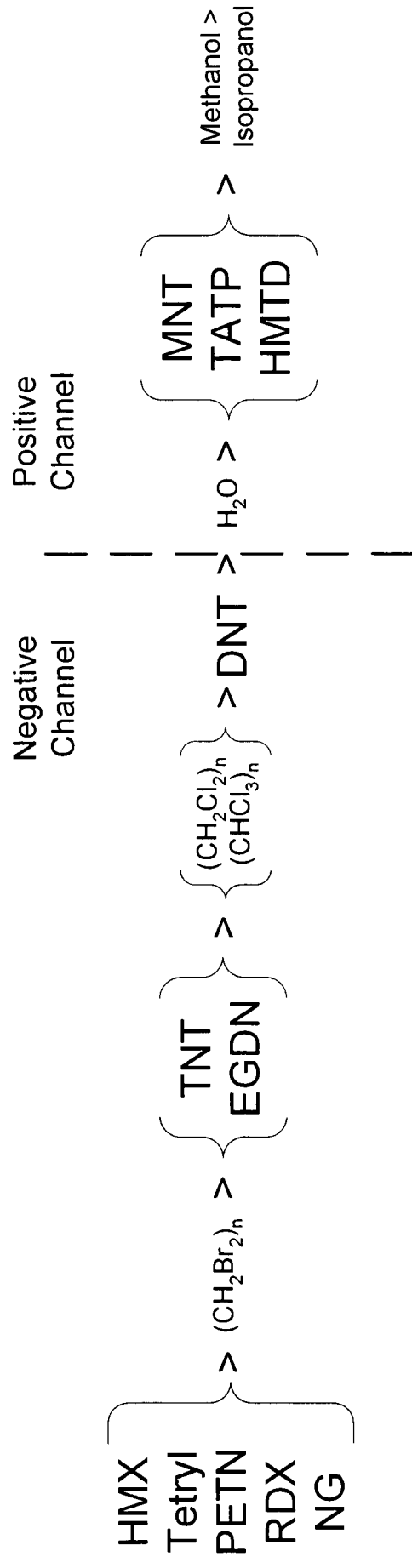
Explosive/ Taggant	No Dopant	CH ₂ Br ₂ , 2%	CH ₂ Cl ₂ , 2.5%	CH ₃ OH, 1%	Isopropanol, 2%
	✓, Negative ✓, Positive	✓, Negative	✓, Negative ✓, Positive	✓, Negative	✓, Negative
RDX t=37 sec(+) t=72 sec(-)	Vc=-0.3, --negative Vc=-4.92, --positive Rf 950V, Air, 120 C, 1atm, mix6x10 Pos and neg are at different retention time, break down effect	Vc=-9, Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml	Vc=-8.43, --negative Vc=-6.68, --positive Rf 950V, Air, 120 C, 1atm, mix6x10 Pos and neg are at different retention time, break down effect	Vc=-2.58, Rf 950V, Air, 120 C, 1atm, mix6x10 no Pos ion shown, MeOH depressed it.	Vc=-6.68, Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml
	✓, Negative	✓, Negative	✓, Negative	✓, Negative	✓, Negative
NG t=31 sec	Two Peaks Vc=-0.23, -20.7, Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-10, Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml	one peak Vc=-9.6, Rf 950V, Air, 120 C, 1atm, mix6x10	Two peaks Vc=-2.58, -33.7, Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-10, Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml
	✓, Negative	X	✓, Negative	✓, Negative	✓, Negative
TNT t=72 sec	Vc=-0.82, Rf 950V, Air, 120 C, 1atm, mix6x10		Vc=-2.58, Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-0.82, Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-10, Rf 1050V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml
	✓, Negative	X?	✓, Negative	✓, Negative	✓, Negative
EGDN t=10 sec	Vc=-20, Rf 950V, Air, 120 C, 1atm, mix6x10		Vc=-34, Rf 950V, Air, 120 C, 1atm, 2 uL, 0.1 mg/ml peak too close to MeCl ₂ (- 36 V)	Vc=-33.7, Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-30, Rf 850V, N ₂ , 120 C, 1atm, 1 uL, 0.1 mg/ml peak too close to Isopropanol (-32 V)
	✓, Negative	X	X	✓, Negative	✓, Negative
DNT t=48 sec	Vc=-1.7 Rf 950V, Air, 120 C, 1atm, mix6x10	no peaks	no peaks	Vc=-2 Rf 950V, Air, 120 C, 1atm, mix6x10	Vc=-16.7 Rf 950V, N ₂ , 120 C, 1atm, weak signal decreased by 20 times

FIG. 9 (Part 2)

Explosive/ Taggant	No Dopant	CH ₂ Br ₂ , 2%	CH ₂ Cl ₂ , 2.5%	CH ₃ OH, 1%	Isopropanol, 2%
	✓, Positive	Not measured	✓, Positive	X	Not measured
O-MNT Taggant t=16 sec	V _c =-17.8, Rf 950V, Air, 120 C, 1atm, too close to RIP		V _c =-14.3, Rf 950V, Air, 120 C, 1atm, too close to RIP		
	✓, Positive	Not measured	✓, Positive	X	Not measured
p-MNT Taggant 19 sec	V _c =-16.7, Rf 950V, Air, 120 C, 1atm, too close to RIP		V _c =-14.9, Rf 950V, Air, 120 C, 1atm, too close to RIP		
	✓, Positive	Not measured	✓, Positive	X	Not measured
DMNB t=17 sec	V _c =-7.9, Rf 950V, Air, 120 C, 1atm		V _c =-9, Rf 950V, Air, 120 C, 1atm		
	✓, Positive	Not measured	✓, Positive	✓, Positive	X
TATP t=13 sec	V _c =-8.43, Rf 950V, Air, 120 C, 1atm		V _c =-10.8, Rf 950V, Air, 120 C, 1atm	V _c =-5, Rf 950V, Air, 120 C, 1atm	
	✓, Positive	Not measured	✓, Positive	✓, Positive	X
HMTD t=49 sec	V _c =1.5, Rf 950V, Air, 120 C, 0.6atm old sample		V _c =-1.4, Rf 950V, Air, 120 C, 1atm new sample	V _c =-0.82, Rf 950V, Air, 120 C, 1atm old sample	
	✓, Negative ✓, Positive	Not measured	✓, Negative ✓, Positive	Not measured	✓, Negative
AN t(+)=3 sec t(-)=6 sec	V _c =-19.6, --negative V _c =-19.6, --positive Rf 950V, air, 120 C, 1atm Pos and neg are at different retention time, break down to NH ₃ (+) and HNO ₃ (-)		V _c =-41.83, --negative V _c =-24.3, --positive Rf 950V, air, 120 C, 1atm Pos and neg are at different retention time, break down to NH ₃ (+) and HNO ₃ (-)		V _c =-3.75, Rf 950V, Air, 120 C, 1atm, mix6x10 no Pos ion shown, Isopropanol depressed it.

FIG. 9 (Part 3)

Electron Affinity



Proton Affinity



FIG. 10

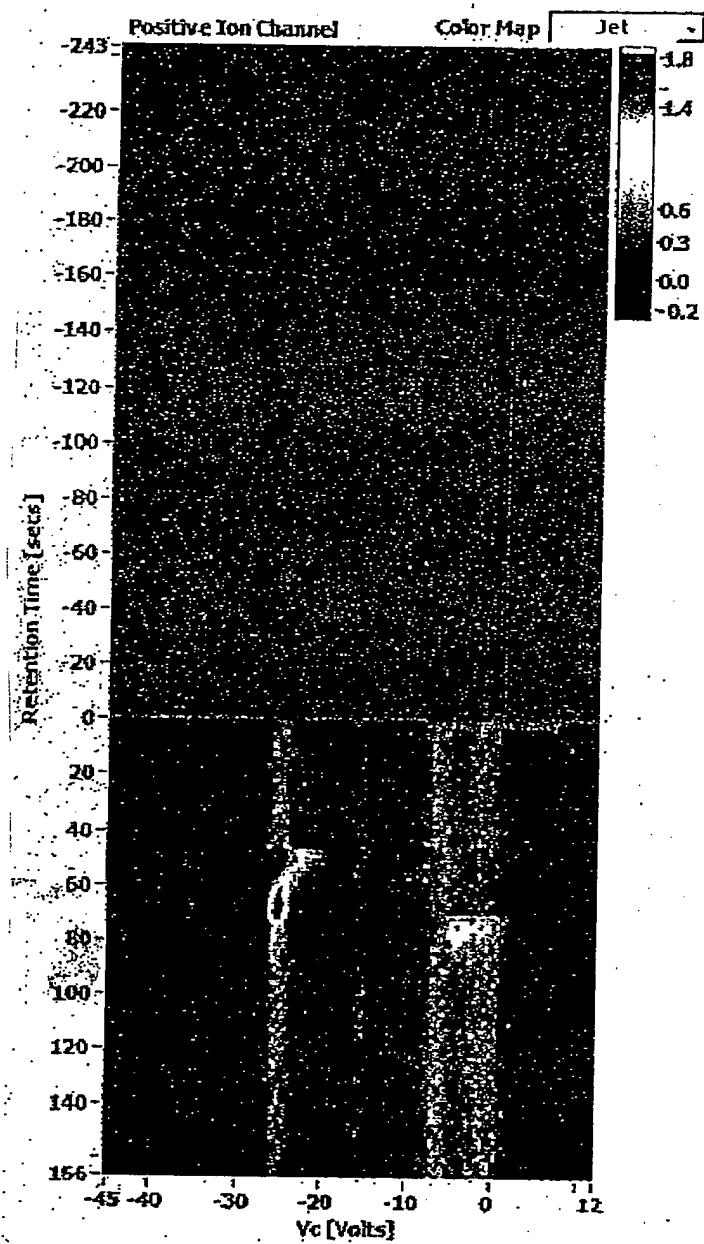


FIG. 11a

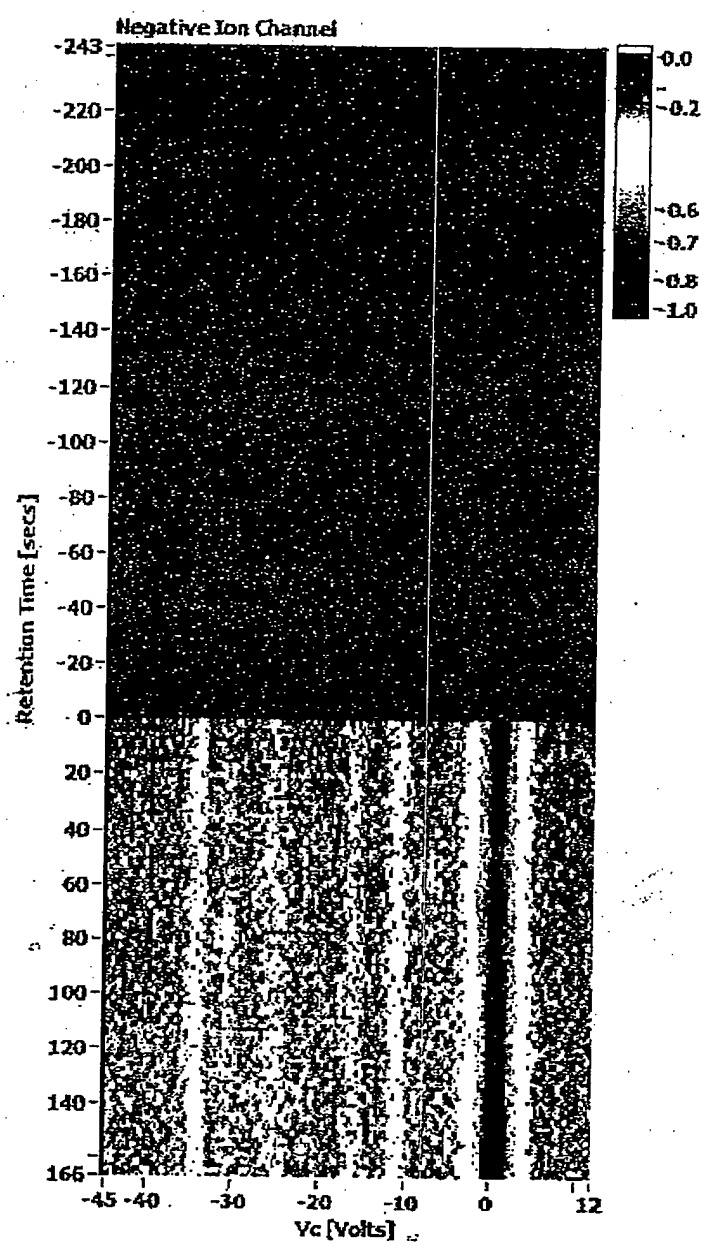


FIG. 11b

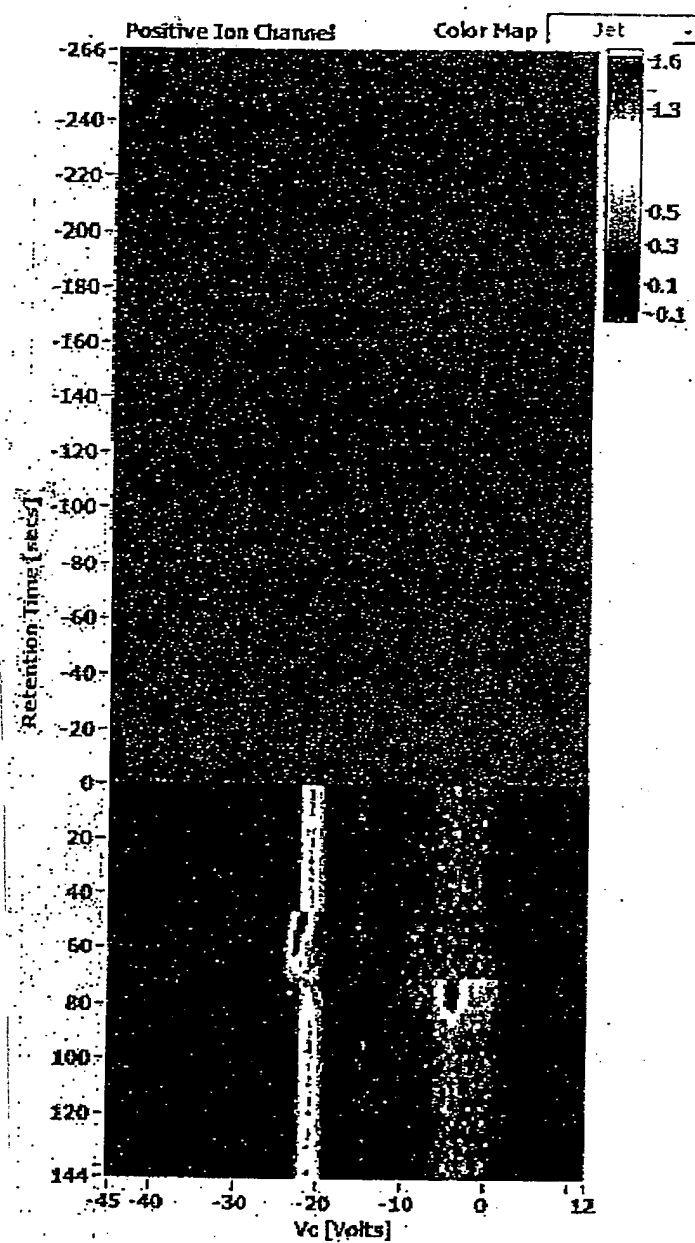


FIG. 12a

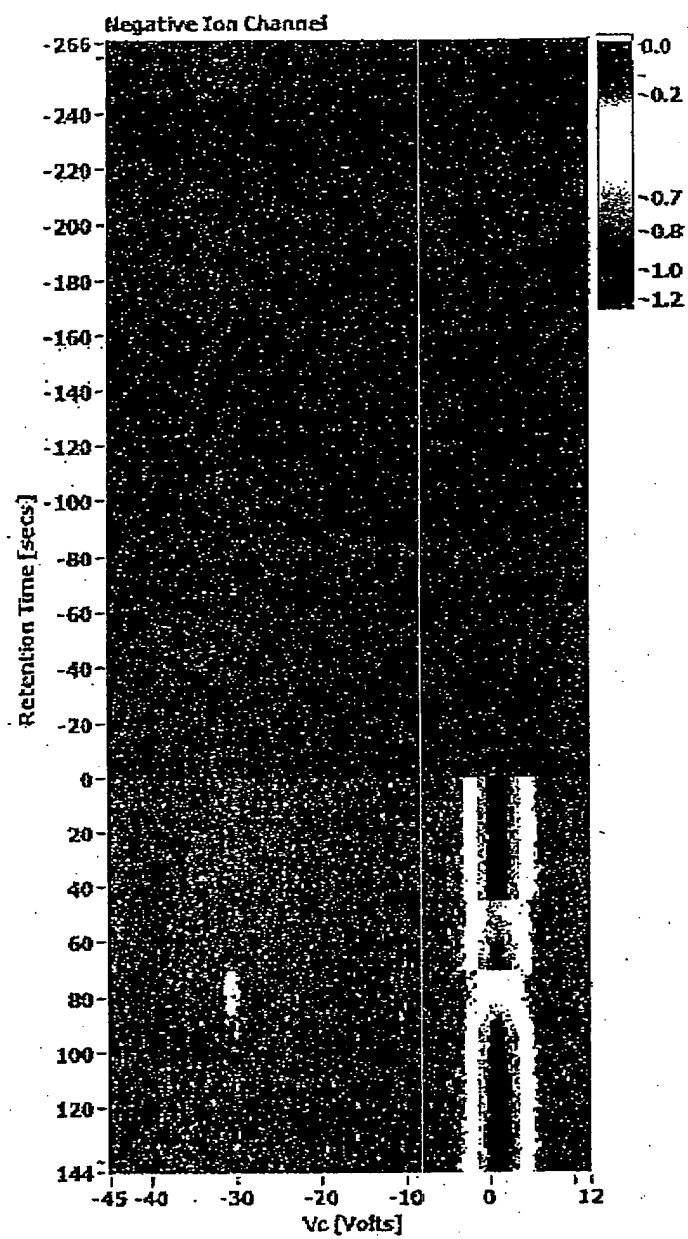


FIG. 12b

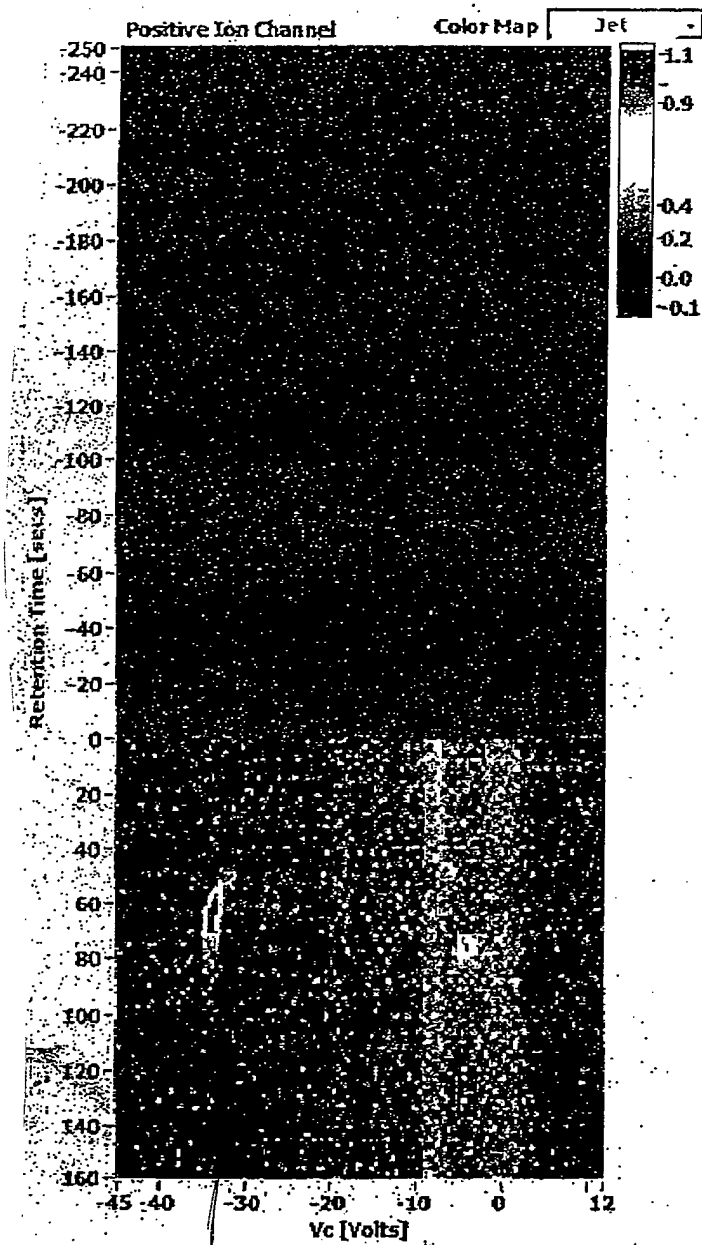


FIG. 13a

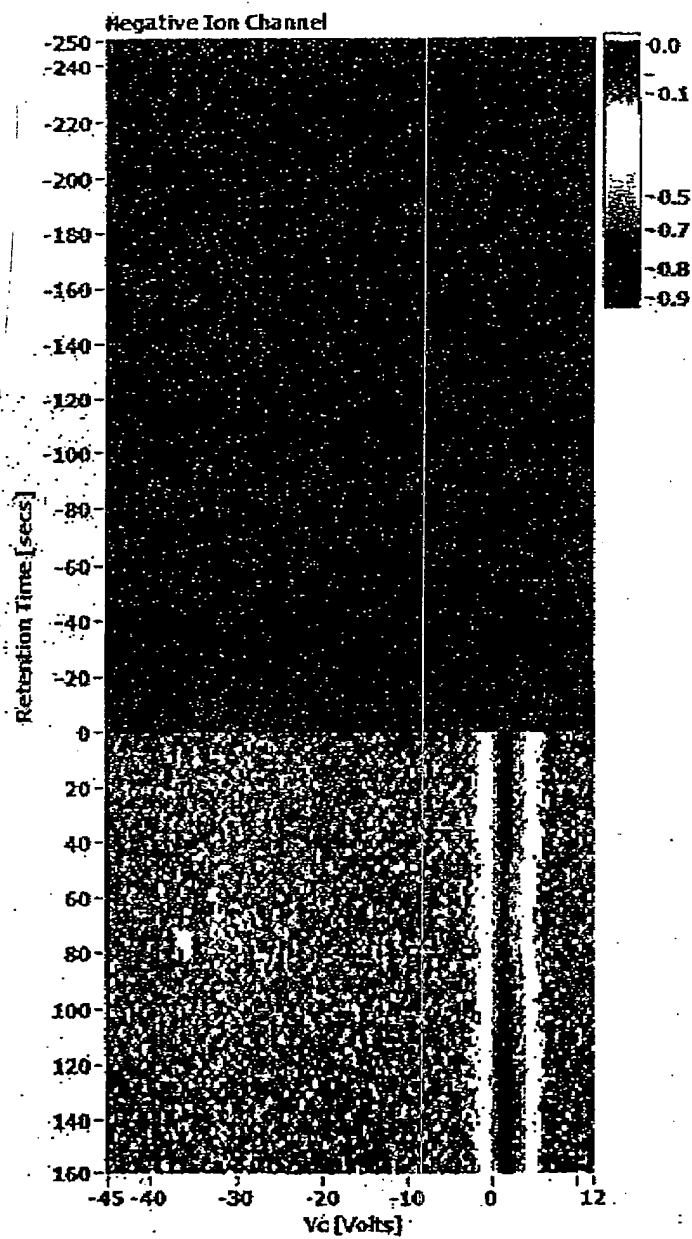


FIG. 13b

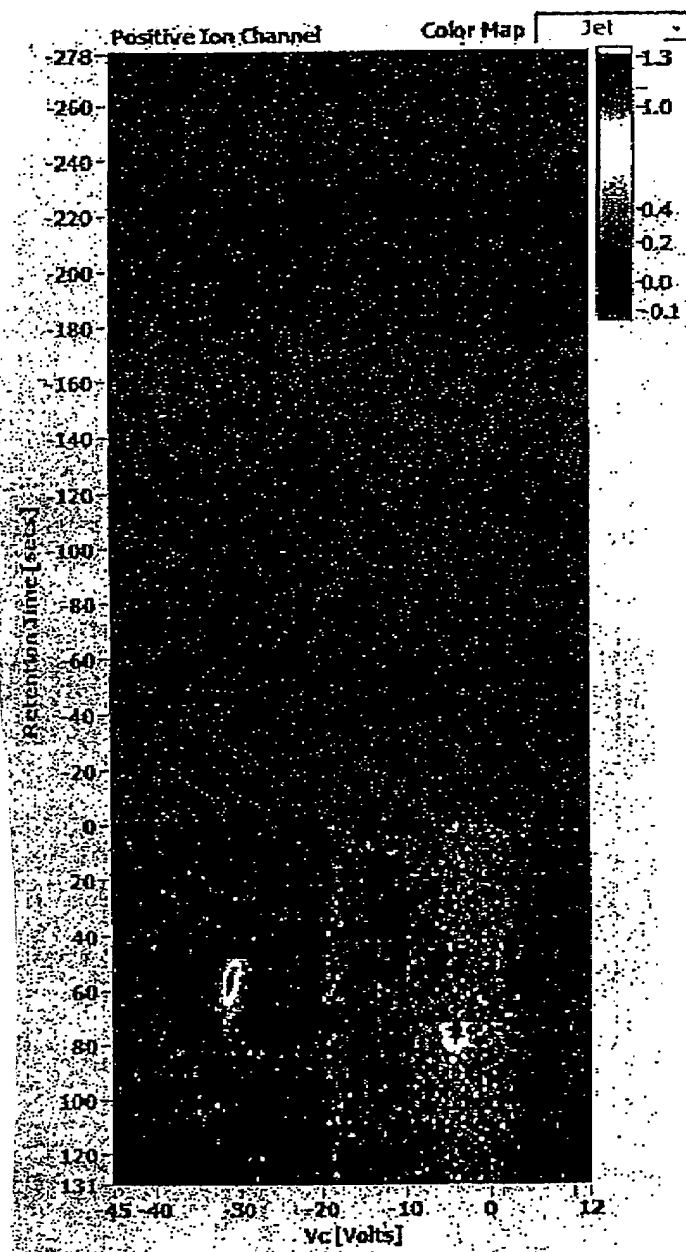


FIG. 14a

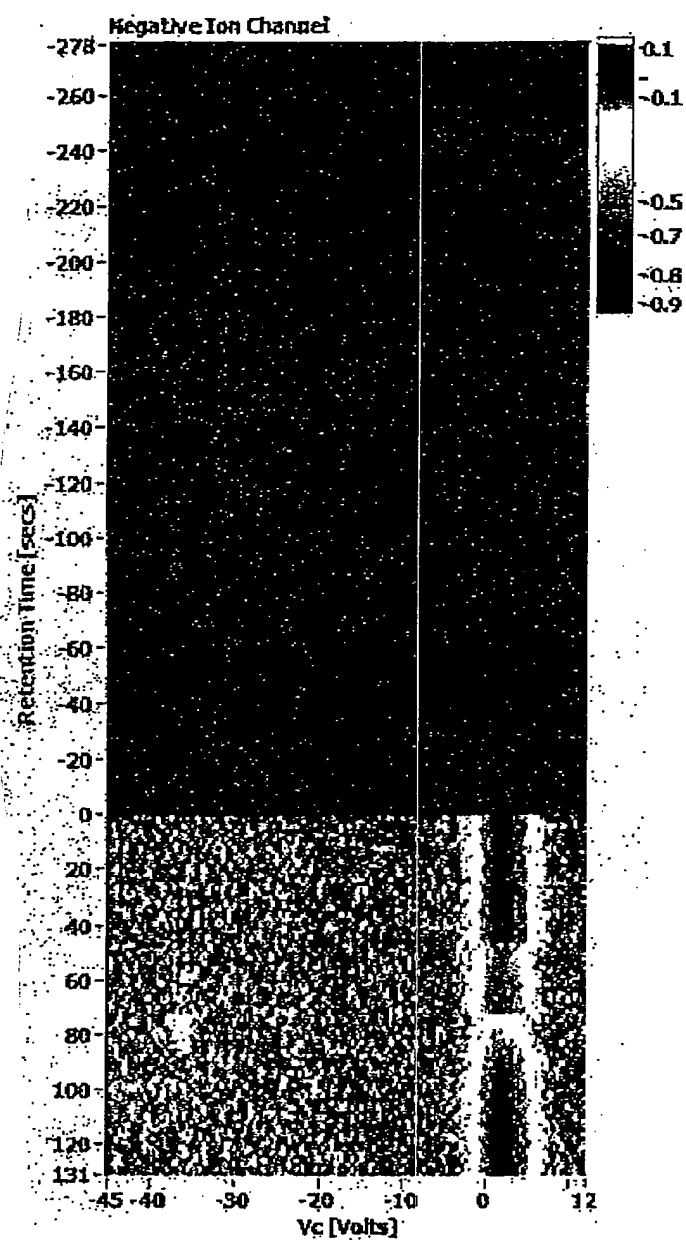


FIG. 14b